1. Which among the following set of quantum numbers is **not** allowed for the values of (n, l, m, s) ?

   (A) (2, 1, 1, 2) (B) (1, 0, 1, +1/2)

   (C) (2, 1, 1, +1/2) (D) (4, 3, −1, −1/2)

2. The effective nuclear charge in the electron in He atom is :

   (A) 2 (B) 1.7 (C) 1.15 (D) 1.65

3. The electron configuration of $Fe^{2+}$ is :

   (A) [Ar] $3d^5\ 4s^1$ (B) [Ar] $3d^6\ 4s^0$ (C) [Ar] $3d^4\ 4s^2$ (D) [Ar] $3d^5\ 4s^0$

4. The radius ratio between 0.025 and 0.414 favours the coordination number of :

   (A) 8 (B) 4 (C) 6 (D) 3

5. $sp^3$ hybridization results in _____ arrangement of hybrid orbitals.

   (A) triangular (B) pyramidal (C) tetrahedral (D) linear

6. The shape of $NH_3$ is :

   (A) angular (B) pyramidal (C) tetrahedral (D) linear

7. Ethene has _____ sigmas bonds and _____ pi bonds.

   (A) 1, 1 (B) 4, 1 (C) 6, 0 (D) 5, 1

8. Which among the following is the artificial radioactive series ?

   (A) Uranium Series (B) Actinium Series

   (C) Neptunium Series (D) Thorium Series

9. The splitting of spectral lines in an electric field is called :

(A) Zeeman effect (B) Photoelectric effect

(C) Stark effect (D) Thomson effect

10. Which among the following is paramagnetic ?

(A) CO (B) NO (C) $O^{2-}$ (D) $O^{2+}$

11. Which among the following can form intramolecular hydrogen bonding ?

(A) benzoic acid (B) water (C) o-nitrophenol (D) p-nitrophenol

12. Photoelectric effect demonstrates the _____ nature of light.

(A) wave (B) particle

(C) both particle and wave (D) neither particle nor wave

13. In a reversible reaction, the reaction rate of the backward reaction is :

(A) Positive (B) Negative

(C) Zero (D) Can be positive or negative

14. Hydrolysis of ethyl acetate in presence of excess of water is a _____ order reaction.

(A) zero (B) first (C) pseudo first (D) second

15. The rate of a chemical reaction doubles for every 10°C rise in temperature. If the temperature is increased by 60°C, the rate of the reaction increases by about :

(A) 10 times (B) 128 times (C) 32 times (D) 64 times

16. Quantum yield of the reaction $2HBr \rightarrow H_2 + Br_2$ is :

(A) 1 (B) 2 (C) 0.5 (D) 4

17. Emission of light as a result of chemical reaction is :

(A) fluorescence (B) phosphorescence

(C) chemiluminescence (D) photosensitization

18. Substances which reduce the quantum yield of photochemical reactions are called :

(A) photo inhibitors (B) photo initiators (C) catalysis (D) photo sensitizers

19. Which of the following is a **correct** notation for an orbital with n=4 and l=2 ?

(A) 4p (B) 4f (C) 4d (D) 4s

20. $Na^+$ is isoelectronic with :

(A) $K^+$ (B) $Al^{3+}$ (C) $Ca^{2+}$ (D) $Cl^-$

21. Which of the following hybridizaton tends to give maximum electro negativity for an atom ?

(A) $sp^2$ (B) sp

(C) $sp^3$ (D) All have the same effect

22. Which of the following is a p-block element ?

(A) Rb (B) Cs (C) Sr (D) Sb

23. The hybridization of chlorine in $ClF_3$ is :

(A) $sp^3$ (B) $sp^3d$ (C) $dsp^3$ (D) None of these

24. Which of the following is unstable according to M.O. theory ?

(A) $He_2^+$ (B) $C_2$ (C) $He_2$ (D) $O_2^-$

25. A molecule having all the bond angels equal to 90° is :

(A) $PCl_5$ (B) $CH_4$ (C) $SF_6$ (D) $BeCl_2$

26. The hybridization of carbon $CO_2$ is :

(A) sp (B) $sp^2$ (C) $sp^3$ (D) $sp^3d$

27. Which of the following and $_{14}Si^{30}$ are isotones ?

(A) $_{15}P^{32}$ (B) $_{13}Al^{29}$ (C) $_{16}S^{31}$ (D) $_{16}S^{33}$

28. The stable end product of Uranium series is :

(A) $_{83}Bi^{209}$ (B) $_{82}Pb^{206}$ (C) $_{82}Pb^{207}$ (D) $_{82}Pb^{209}$

29. Which of the following nuclide is a fissile material ?

(A) $_{92}U^{238}$ (B) $_{90}Th^{232}$ (C) $_{91}Pa^{231}$ (D) $_{92}U^{235}$

30. The nuclear fuel used in the Nagasaki Bomb was :

(A) $_{92}U^{233}$ (B) $_{94}Pu^{239}$ (C) $_{92}U^{235}$ (D) $_{92}U^{238}$

31. The electrochemical equivalent (z) of an element is related to its equivalent mass (E) by the equation :

(A) $E = z$ (B) $E = 96500z$ (C) $z = 96500E$ (D) $z/E = 96500$

32. The unit of molar conductance is :

(A) $Ohm^{-1}\ cm\ mol^{-1}$ (B) $Ohm^{-1}\ cm^3\ mol^{-1}$

(C) $Ohm^{-1}\ cm^2\ mol^{-1}$ (D) $Ohm^{-1}\ cm^{-1}\ mol^{-1}$

33. Which of the following particles is the best projectile in bombardment reactions ?

(A) $_1H^2$ (B) $_2He^4$ (C) $_0n^1$ (D) $_1H^1$

34. The isotope used for the treatment of Thyroid disorders is :

(A) $I^{132}$ (B) $Sr^{90}$ (C) $I^{131}$ (D) $Co^{60}$

35. Which of the following is **not** a chelating ligand ?

(A) EDTA (B) Ethylene diammine (C) Oxalate (D) Ammonia

36. Vitamin $B_{12}$ is a coordination compound of :

(A) Mg (B) CO (C) Fe (D) Zn

37. Inter system crossing is essential for :

(A) Phosphorescence (B) Fluorescence

(C) Photosensitization (D) Chemiluminescence

38. Smoke is an example of :

(A) an emulsion (B) a gel (C) a solid aerosol (D) a liquid aerosol

39. How many significant figures are present in the number 0.0038 ?

(A) 5 (B) 4 (C) 2 (D) 1

40. A weighing balance is accurate to the nearest milligram. Which is the **correct** numerical representation for the weight of the substrate ?

(A) 2.0 g (B) 2.00 g (C) 2.000 g (D) 2.0000 g

41. The term used to express precision :

(A) Standard deviation (B) Relative error

(C) Molality (D) Molarity

42. Closeness to the measured value to the **correct** value is called as :

(A) Precision (B) Accuracy (C) Standard factor (D) Quotient

43. In the titration of NaOH against oxalic acid, the indicator used is :

(A) Phenolphthalein (B) Methyl orange

(C) $KMnO_4$ (D) Iodine

44. The external indicator used in dichrometry titration is :

(A) Potassium ferrocyanide (B) Potassium ferricyanide

(C) N-phenyl anthranilic acid (D) $KMnO_4$

45. The unit for concentration which is independent of temperature :

(A) Molarity (B) Molality (C) Normality (D) Indicator

46. The substance used to prepare a solution of known concentration is :

(A) Primary standard (B) Indicator (C) Buffer (D) Analyte

47. Pick out the odd one :

(A) Astronomy (B) Astrology (C) Phrenology (D) Acupuncture

48. A hypothesis, if passes all challenging tests, is promoted to :

(A) Scientific hypothesis (B) Null hypothesis

(C) Theory (D) Auxiliary hypothesis

49. The best known scientific method is :

(A) Positivism (B) Empiricism (C) Induction (D) Deduction

50. Which of the following statements about radio activity is **not** correct ?

(A) It is a nuclear property

(B) It does not involve any rearrangement of electrons

(C) It is not affected by the presence of other elements

(D) The rate is affected by change of temperature or pressure

51. Radioactive disintegration differs from a chemical change in being :

(A) An exothermic change (B) A spontaneous process

(C) A nuclear process (D) A first order reaction

52. β-rays :

(A) Have greater ionizing power than alpha rays

(B) Possess greater penetrating power than gamma rays

(C) Are rejected when light falls on active metals

(D) Carry charge opposite in sign but equal in magnitude than a proton

53. Alpha rays consist of a stream of :

(A) $H^+$ (B) $He^{2+}$ (C) Only electrons (D) Only neutrons

54. Unit of radioactivity :

(A) Rad (B) Grey (C) Becquerel (D) Curie

55. When passing through a magnetic field, the largest deflection is experienced by :

(A) $\alpha$-rays (B) $\beta$-rays (C) $\gamma$-rays (D) All equal

56. With the passage of time, the rate of radioactive disintegration :

(A) Increases (B) Decreases

(C) Remains same (D) May increase or decrease

57. In the reaction ${}_4Be^9 + X \rightarrow {}_5B^9 + \gamma$, X is :

(A) Protons (B) Deuterons (C) Positron (D) Neutrons

58. Which of the following projectiles is the best for bombarding the articles ?

(A) $\alpha$-particles (B) protons (C) deuterons (D) neutrons

59. Which of the radioactive series has Bismuth as end product ?

(A) 4n (B) 4n + 1 (C) 4n + 2 (D) 4n + 3

60. The lowest lattice energy among the following crystals is :

(A) NaCl (B) KCl (C) RbCl (D) CsCl

61. The Born exponent of $Ag^+$ ion type is :

(A) 5 (B) 7 (C) 9 (D) 10

62. The correct order of decreasing polarisibility of the ions is :

(A) Cl, Br, F, I (B) Cl, I, Br, F (C) Br, F, I, Cl (D) I, Br, Cl, F

63. Which of the following has the highest ionization energy ?

(A) $Na \rightarrow Na^+ + e$ (B) $Al \rightarrow Al^+ + e$ (C) $Al^+ \rightarrow Al^{2+} + e$ (D) $Al^{2+} \rightarrow Al^{3+} + e$

64. The magnitude of lattice energy of a solid increases if the ions are :

(A) Large (B) Small (C) Equal size (D) No effect

65. Born-Haber cycle is used to determine :

(A) Electronegativity (B) Entropy

(C) Lattice energy (D) All the above

66. Paracetamol is a :

(A) Hypnotic (B) Anti pyretics

(C) Anti depressants (D) Tranquillisers

67. The maximum electron capacity of any orbital is :

(A) 2 (B) 3 (C) 8 (D) 6

68. Which among the following has the highest ionization energy ?

(A) Boron (B) Carbon (C) Nitrogen (D) Oxygen

69. The function of the atom bomb is based on :

(A) natural radioactivity (B) nuclear fission and chain reactions

(C) spontaneous chemical reactions (D) nuclear fusion

70. With dilution, the molar conductance of an electrolytic solution :

(A) decreases (B) increases

(C) remains unchanged (D) decreases or increases

71. Bauxite is an ore of :

(A) Copper (B) Aluminium (C) Zinc (D) Titanium

72. The electron affinity of group 18 elements is :

(A) zero
(B) larger than halogens
(C) larger than alkali metals
(D) larger in the period of elements

73. The most electronegative element is :

(A) oxygen (B) nitrogen (C) chlorine (D) fluorine

74. The coordination number of cobalt in $[co(en)_2Cl_2]^+$ is :

(A) 3 (B) 4 (C) 5 (D) 6

75. Born-Haber cycle is used to calculate :

(A) refractive index (B) density (C) $R_f$ Value (D) lattice energy

76. Sulphide ions are concentrated by :

(A) leaching
(B) froth floatation
(C) liquation
(D) magnetic separation

77. Fructose is a :

(A) aldopentose (B) ketohexose (C) aldohexose (D) ketopentose

78. Number of elements in the $4^{th}$ period of the periodic table is :

(A) 8 (B) 10 (C) 18 (D) 32

79. The most stable form of cyclohexane is :

(A) chair (B) half chair (C) boat (D) twist boat

80. Identify the spectra that corresponds to the frequency 690 $cm^{-1}$ :

(A) Microwave (B) NMR (C) IR (D) UV

81. Which among the following state functions is an extensive property of the system ?

(A) temperature (B) volume (C) viscosity (D) refractive index

82. The photon of wavelength 400 nm corresponds to :

(A) 20,000 $cm^{-1}$ (B) 25,000 $cm^{-1}$ (C) 50,000 $cm^{-1}$ (D) 40,000 $cm^{-1}$

83. The reagent used for the identification of nickel ion in qualitative analysis is :

(A) Potassium ferrocyanide (B) DMG

(C) EDTA (D) Nessler's reagent

84. The shift of an absorption band to the longer wavelength region is called :

(A) blue shift (B) red shift (C) yellow shift (D) none of these

85. The catalyst used for Friedal Crafts reaction is :

(A) Anhydrous $AlCl_3$ (B) $AlCl_3$

(C) $FeCl_3$ (D) $ZnCl_3$

86. The element with highest electron affinity among halogens is :

(A) F (B) Cl (C) Br (D) I

87. Boiling point of water is much higher than the expected value. This is due to _____ .

(A) Intra molecular hydrogen bonding

(B) Inter molecular hydrogen bonding

(C) Both (A) and (B)

(D) Covalent bonding

88. Conduction due to the direct flow of electrons is known as :

(A) ionic conduction (B) electrolytic conduction

(C) electronic conduction (D) molecular conduction

89. The quantum number 's' denotes :

(A) principal energy level (B) degeneracy of orbitals

(C) number of nodes (D) spin orientation of an electron

90. The compounds $H_2O$ and $H_2O_2$ can be used to illustrate the law of :

(A) constant proportion (B) reciprocal proportion

(C) multiple proportion (D) gaseous volumes

91. The first transition series begins with :

(A) titanium (B) scandium (C) vanadium (D) manganese

92. A triangular arrangement of atoms arises due to :

(A) sp hybridization (B) $sp^2$ hybridisation

(C) $sp^3$ hybridisation (D) $sp^3d$ hybridization

93. The critical temperature $T_c$ is related to Vanderwaal's constant by the relation :

(A) $T_c = 3b$ (B) $T_c = a/27b^2$ (C) $T_c = 8a/27Rb$ (D) $T_c = 2b$

94. Give the number of modes of vibrations possible for $CO_2$ :

(A) 1 (B) 2 (C) 3 (D) 4

95. The hydrolysis of sodium acetate results in a solution which is :

(A) acidic (B) basic (C) neutral (D) cannot predict

96. Ostwald dilution law is applicable to :

(A) weak electrolytes (B) both weak and strong electrolytes

(C) strong electrolytes (D) none of these